

INTERNAL GEAR XPD 676 PUMPS

ENGINEERED TO
API 676
DESIGN STANDARDS



**INDUSTRY'S FIRST FULLY API 676
COMPLIANT INTERNAL GEAR PUMP**



Capacity
to 1,600 GPM (363 M³/Hr)



Pressure
to 200 PSI (14 BAR)
Higher pressures with factory approval



Viscosity
28 to 2,000,000 SSU (1 to 440,000 cSt)
With special construction



Temperature
-20°F to +650°F (-29°C to +340°C)
With special construction

VIKING PUMP
A Unit of IDEX Corporation

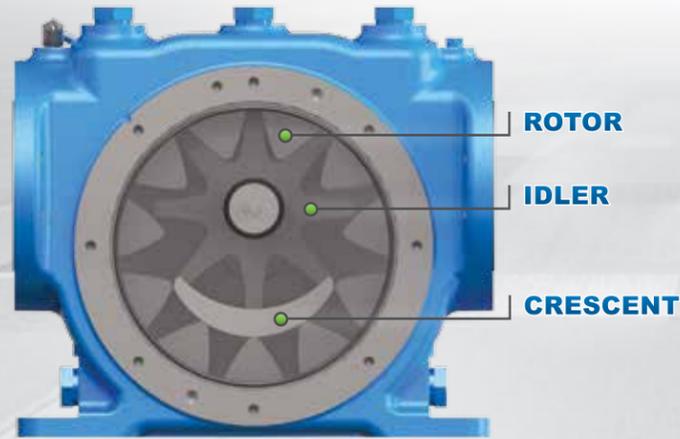
INTERNAL GEAR TECHNOLOGY

Internal Gear (or gear-within-a-gear) technology was invented in 1902 by the founder of Viking Pump, which is the world-leading provider of internal gear process pumps. Internal gear pumps are rotary positive displacement pumps which move the same amount of fluid with each revolution of the shaft. The flow rate is directly proportional to the speed, which enables easy control over the entire performance range using variable speed drives.

Because system pressure has almost no impact on flow rate, unlike centrifugal pumps, internal gear pumps are excellent for continuous processes where multiple streams are metered together. Handling a broad range of viscosities, they are perfect for cold climate applications where oils and chemicals can become very thick in winter, or for handling polymers whose viscosity increases through the reaction process.

Other Viking benefits include:

- High Efficiency
- Reversible Direction of Flow
- Low NPSHr
- Self-priming
- Low Pulsation
- Low Shear
- Adjustable Clearances to Compensate for Wear
- Rigid Shaft Support on Both Sides of the Seal



The API 676 Design Standard: Full Compliance or With Exceptions

Oil, gas and petrochemical plants worldwide select process equipment that conform to API standards to ensure they use only the ultimate in quality, dependability and safety. The API 676 design standard applies to Rotary Positive Displacement pumps like Viking Internal Gear pumps.

The XPD 676 Series from Viking Pump was specifically designed to be in full compliance with every detail of API's 100+ pages of specifications on everything from bearing life to magnetic particle testing of welds, to mounting foot flatness and parallelity. Full conformance reduces risk and simplifies project specs by eliminating sign-offs necessary on non-compliant equipment.

TYPICAL APPLICATIONS

INTERNAL GEAR XPD 676 PUMPS

Offshore Oil Platforms

There are few environments that are more hazardous than an offshore oil platform. Safety is critical, with no room for mistakes. A major oil company selected Viking API 676 compliant pumps for both process (crude oil transfer) and utility (helicopter fuel) applications on oil platforms. These pumps easily handle temperature-related changes in liquid viscosity, and offer the greatest uptime assurance of any Viking Pump, a company known for reliability.



Oil Terminals

Rail is a critical mode of transportation of both crude oil and refined fuels. A recent terminal project involved twelve Viking API 676 compliant pumps for railcar loading of 17,000 BPD of heavy crude, and various grades of gasoline and ethanol, with pumps utilizing double mechanical seals and API seal plans.



Oil Refineries

Refineries handling heavier crudes, especially in extreme climates, can experience NPSHa problems related to incoming feedstocks (railcar loading and unloading) and inter-plant transfer using centrifugal or high-speed screw pumps. A major oil company selected Viking API 676 compliant pumps for unloading crude from railcars to processing.



Petrochemical Plants

Petrochemical processes handle a broad range of materials, from thin solvents to ultra-viscous polymers. A major petrochemical company selected Viking API 676 compliant pumps for polyols at their Middle-East facility due to enhanced reliability ensured by meeting the standard.



Viking Offers Three Options for API 676 Compliance:



- **XPD 676 Series**
(models 4223AX/4323AX)

Steel pumps with 4-bolt mount API 682 cartridge seals and **NO exceptions** to the API 676 standard.

- **Universal 682 Series**
(models 4223AA/4323AA)

Steel or stainless steel pumps with 4-bolt mount API 682 cartridge seals, but **with exceptions** to the standard.

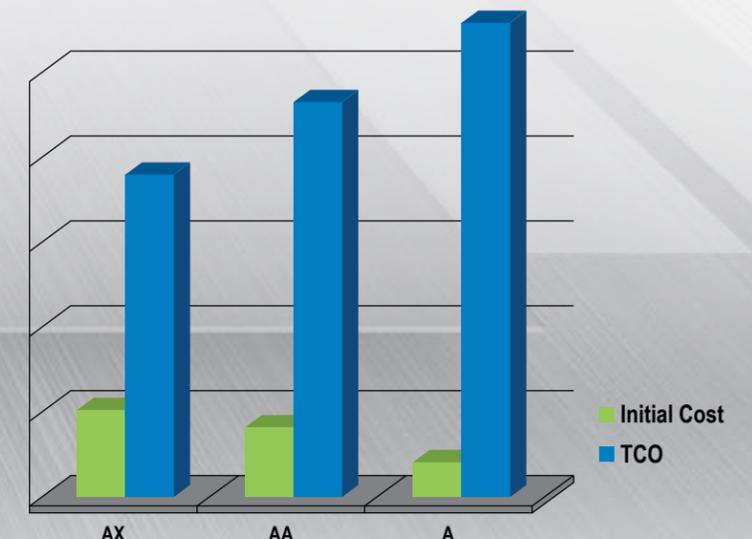
- **Universal Seal Series**
(models 4223A/4323A)

Steel or stainless steel pumps with 2-bolt mount cartridge seals, **with exceptions** to the standard.

Total Cost of Ownership for API 676 Compliant Pumps

Comparison of 4223AX, AA and A models assuming 10 year operating life (other assumptions listed below)

Initial Cost is only a small part of Total Cost of Ownership. Other components include installation and startup costs, power costs for operation, maintenance costs (parts and labor), cost of lost production due to unplanned downtime, and potentially catastrophic accident and litigation costs. This graph compares Viking's three alternatives for API 676 compliance, and illustrates that the XPD 676 Series (AX) models have the lowest Total Cost of Ownership due to their robust design, compared to the Universal 682 (AA) models and Universal Seal (A) models.



XPD 676 APPLICATIONS

INTERNAL GEAR
XPD 676 PUMPS

Typical Liquids Pumped:

UPSTREAM

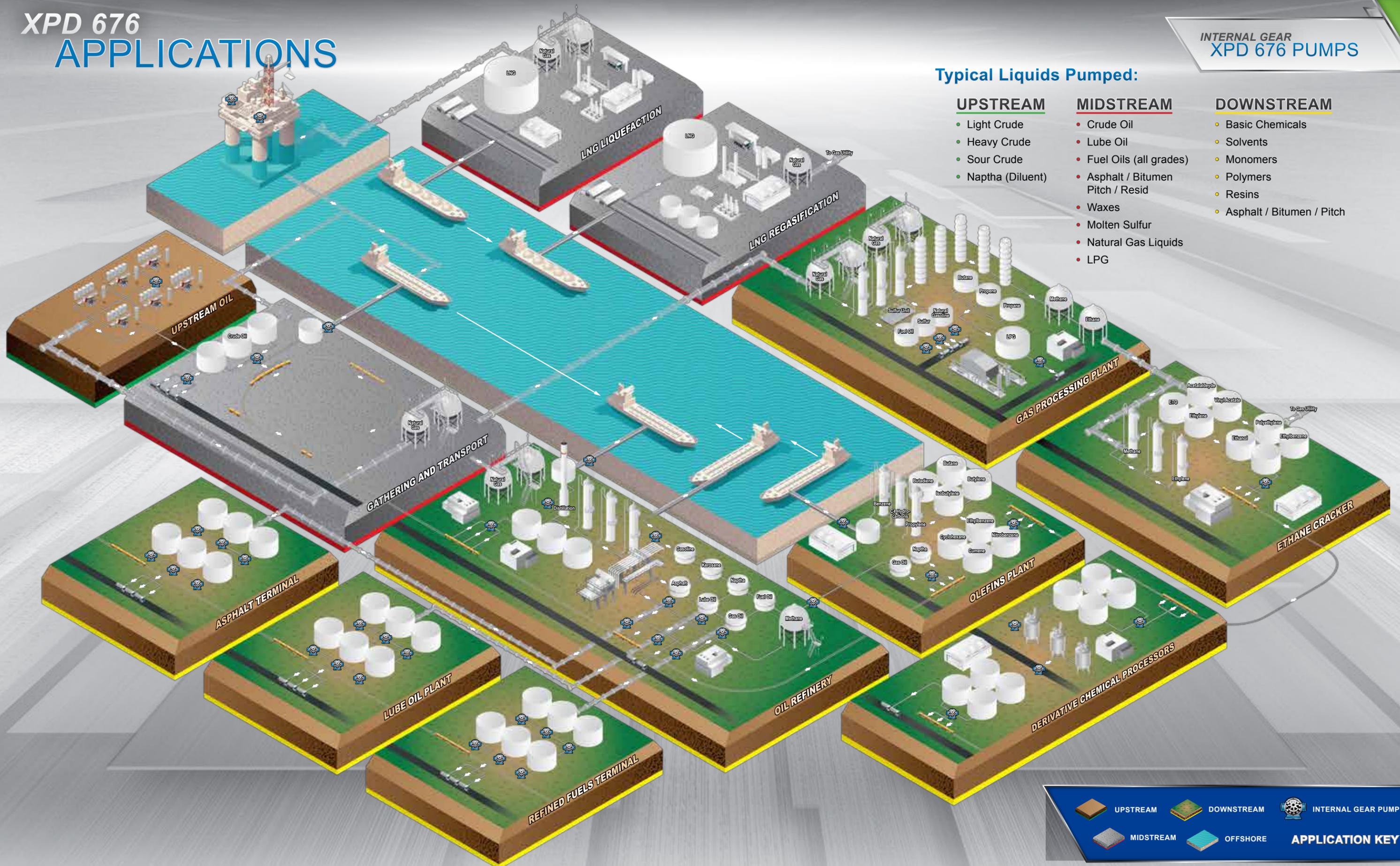
- Light Crude
- Heavy Crude
- Sour Crude
- Naptha (Diluent)

MIDSTREAM

- Crude Oil
- Lube Oil
- Fuel Oils (all grades)
- Asphalt / Bitumen Pitch / Resid
- Waxes
- Molten Sulfur
- Natural Gas Liquids
- LPG

DOWNSTREAM

- Basic Chemicals
- Solvents
- Monomers
- Polymers
- Resins
- Asphalt / Bitumen / Pitch



APPLICATION KEY

- UPSTREAM
- MIDSTREAM
- DOWNSTREAM
- OFFSHORE
- INTERNAL GEAR PUMP

HOW XPD 676 REDUCES RISK

INTERNAL GEAR
XPD 676 PUMPS

Why Use XPD 676 for Critical Chemical, Petrochemical, Oil & Gas Process Applications?

Reduced Risk of Leakage

- Static O-ring sealed joints provides improved sealing vs. flat gaskets
- Metal around tapped holes at least half the bolt diameter
- Non-Destructive Evaluation of castings and welds ensures quality
- Performance tests validate integrity of wetted parts
- Cast-in casing drain reduces leakage when removing for service

Reduced Risk of VOC Emissions

- API 682 seals have established maximum vapor emission rates
- Double seals with API seal plans available to further reduce VOC emissions
- Viking enables use of the customers' plant standard API 682 seals
- Raised face Class 300 flanges exceed specified forces and moments

Reduced Risk of Corrosion Failure

- Additional 3mm corrosion allowance over MACP on pressure-containing components
- Other alloys available:
NACE compliant steel, low-temperature steel, stainless steel, Alloy 20, etc.
- Exposed parts protected with rust preventative at factory
- Ports covered with gasket and blind flange for long term storage

Reduced Risk of Overpressure Failure

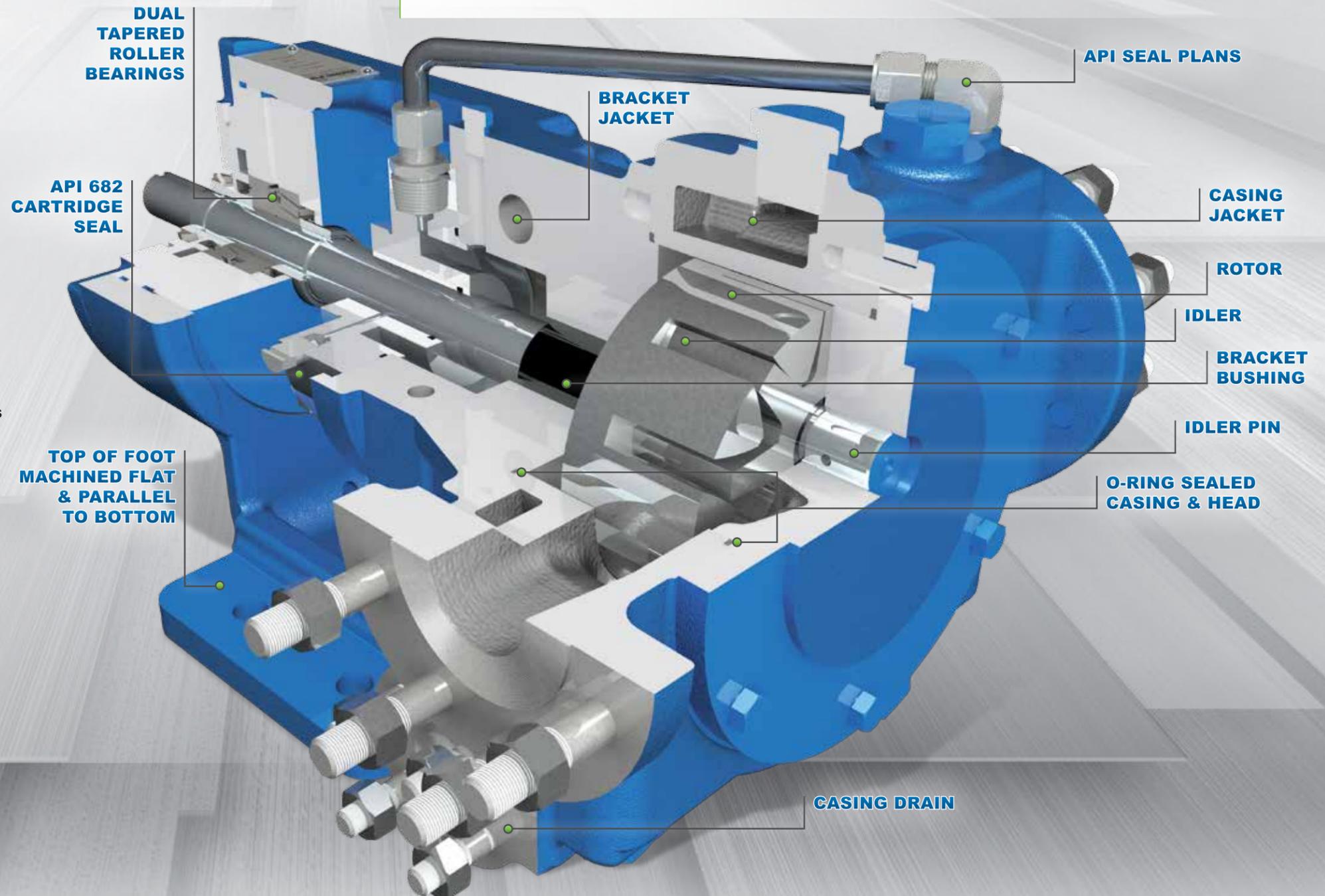
- Average of 80% more steel in XPD 676 pumps than equivalent Universal Seal models
- The Grade WCC steel used in XPD 676, stronger than Viking's standard Grade WCB
- Pressure containing components made of fully normalized and tempered steel
- High strength fasteners with grade and manufacturer stamp

Reduced Risk of Unplanned Downtime

- API 682 Seal designed to operate continuously for 25,000 hours
- Thrust bearings designed for minimum 25,000 hour L-10 life
- Operation at relatively low speeds (vs. screw or centrifugals)
- Optional hard parts available for abrasive liquids:
 - Tungsten carbide or silicon carbide bushing & seal faces
 - Hardened steel idler
 - Hardening treatments or coatings

API 682 Seals

- Designed to operate continuously for 25,000 hours without need for replacement
- Enlarged seal chamber provides greater liquid volume for enhanced cooling
- Four-bolt mount with O-ring face seal helps prevent leakage & emissions
- Top porting of seal plan connections on gland plate to eliminate gas entrapment
- Seal gland is standard with separate quench and drain connections



VIKING PUMP ADVANTAGE

INTERNAL GEAR
XPD 676 PUMPS

Viking Pump has been a global leader in positive displacement pumping solutions since 1911. With a vertically integrated manufacturing process, we have the tools, processes and systems to produce our products in-house; from the initial engineering analysis, through design layout, foundry casting and machining, to final assembly/testing and shipping. Viking pump is uniquely designed for the task at hand, from simple solutions to your most advanced and demanding needs.



WORLD HEADQUARTERS



MANUFACTURING & IRON FOUNDRY



ALLOYS FOUNDRY

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VIKING PUMP

VIKING PUMP, INC.
A Unit of IDEX Corporation
406 State Street
Cedar Falls, Iowa 50613 U.S.A.
Telephone: (319) 266-1741
Fax: (319) 273-8157
vikingpump.com

Contact Your Distributor Today

Distributed By:

United States
www.vikingpump.com

Cedar Falls, Iowa
Phone: (319) 266-1741

Canada
www.vikingpumpcanada.com
Windsor, Ontario
Phone: (519) 256-5438

Europe & Africa
www.vikingpump.com

Shannon, Ireland
Phone: +353 (61) 471933

Asia-Pacific
www.idexfmt-asia.com
China - Shanghai
Phone: +86-21-5241-5599

Singapore
Phone: +65-6684-7305

India - Mumbai
Phone: +91-22-66780049/53

Korea - Seoul
Phone: +82-19-9134-1110

Latin America
www.vikingpump.com

Mexico D.F., C.P.
Phone: +52 (55) 5255-1357

Brazil - Sao Paulo
Phone: +55 (19) 3871-3500

Australia & New Zealand
www.vikingpump.com

Australia
Phone: +61 (0)2 4574 0448

Middle East
www.idexfmt-asia.com

Dubai, UAE
Phone: +973-4-299-1095/1097

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